Army-Baylor University Graduate Program in Health and Business Administration

# Graduate Management Project:
# Bridging the Gap in Hospital Preparedness

Presented to LTC Robert J. Griffith



In partial fulfillment of the requirements for
HCA 5661 – Administrative Residency

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The purpose of this study was to develop a baseline measurement tool by assessing individual attitudes regarding hospital preparedness, departmental preparedness, and preparedness through education and training. This paper reviews personnel attitudes towards preparedness at Johns Hopkins Hospital, types of training used in disaster preparedness and their effectiveness, the use of individual and family preparedness plans, and provides recommendations for further evaluation and measurement.

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## Abstract

The purpose of this study was to develop a baseline measurement tool by assessing individual attitudes regarding hospital preparedness, departmental preparedness, and preparedness through education and training. This paper reviews personnel attitudes towards preparedness at Johns Hopkins Hospital, types of training used in disaster preparedness and their effectiveness, the use of individual and family preparedness plans, and provides recommendations for further evaluation and measurement.

## Disclaimer

The opinions expressed herein are those of the author and do not reflect the official policy or position of Johns Hopkins Hospital, Baylor University, the Department of the Navy, the Department of the Army, the Department of Defense, or the U.S. Government.

## Ethical Considerations

No individually identifiable information was utilized for this project. The author declares no conflict of interest or financial interest in any product or service mentioned in this paper.

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# Introduction

It is generally accepted that emergency preparedness and response should be characterized by measurable goals and effective efforts to identify key gaps between those goals and current capabilities, with a clear plan for closing those gaps and, once achieved, sustaining desired levels of preparedness and response capabilities and performance. Hospitals can never be completely safe; total security is an unachievable goal. Therefore, the issue becomes what is an acceptable and achievable measure of risk to guide our overall readiness (Jenkins, 2006).

Every hospital system is unique in that each one has different variables based on geographic location, system capabilities, socio-economic differences, education and training, resource availability, and financial constraints. When evaluating the level of organizational preparedness, several variables must be considered when assessing overall readiness.

## *Conditions that Prompted the Study*

Both personal and professional interests provide foundations for this graduate management project. During the didactic phase of my program at the Army-Baylor University Graduate Program in Health and Business Administration, I was afforded the opportunity to conduct an independent study on Emergency and Disaster Preparedness. This subject intrigued me because after the attacks of September 11$^{th}$ and the devastation caused by hurricane Katrina, the importance of disaster preparedness truly hit home. It perpetually touched us all in one way or another by affecting our communities, loved ones, economy, sense of security, and trust in our local, state, and federal emergency systems. As a society we were immediately forced to evaluate the deficiencies in our current system and work

towards creating a response structure where processes, standards, procedures, and communication were cohesive and universal through all levels of response. While doing research for that course I realized that while most accreditation organizations stressed emergency and/or disaster preparedness for healthcare organizations, a nationally recognized measurement instrument to measure preparedness did not exist.

Upon arriving at Johns Hopkins Hospital (JHH) in Baltimore, MD for the residency phase of my graduate program, I was assigned the task of helping the hospital determine its level of emergency and/or disaster preparedness and identify ways to improve its preparedness. This was truly ground-breaking work because at the time of my arrival, a full time disaster coordinator position did not exist at the hospital.

During the first part of my residency I began developing a survey instrument that could be used to measure emergency and/or disaster preparedness. Before I could complete this work, the Agency for Healthcare Research and Quality (AHRQ) released a hospital preparedness questionnaire that was designed to allow hospitals to collect information on how well prepared hospitals are to deal with a public health emergency involving a chemical, biological, radiological, nuclear, and explosive event. The *Preparedness for Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE) Events: Questionnaire for Health Care Facilities* was a Web-based, downloadable questionnaire. AHRQ intended for the questionnaire to be a vehicle for hospitals and health care facilities to administer at their discretion. The questionnaire was designed to be downloaded and administered by two types of users: a) States, localities, and multi-hospital systems,

which can administer the questionnaire to hospitals and health care facilities in their jurisdictions to assess overall hospital emergency preparedness; and b) individual hospitals or health care facilities, which can use the questionnaire as a checklist of areas that should be considered as a facility develops or improves emergency preparedness and response plans. It is important to note that AHRQ is not administering the questionnaire and it will not be collecting data compiled from it. The original questionnaire had 43 questions in the following 8 categories (AHRQ, 2007):

- Administration and planning
- Education and training
- Communication and notification
- Patient (surge) capacity
- Staffing and support
- Isolation and decontamination
- Supplies, pharmaceuticals, and laboratory support
- Surveillance

When evaluating the original questionnaire, Johns Hopkins Hospital looked at whether the questionnaire should be used to assess overall hospital emergency preparedness or to use as a tool to assess specific areas that may need further detailed attention. At the time of the beginning of this project, Johns Hopkins felt that as a whole, the hospital was ready to respond and recover via an all hazards approach (that is, for all risks) that may impact the hospital, its campus, community and region. If a plan is not in place for a specific type of disaster, there is a timely process whereby the Office of Emergency Management and the Emergency Management Committee can expeditiously develop a response and recovery process or a very active preparedness and mitigation process.

Johns Hopkins Hospital has a 24/7, 365 days a year dedicated disaster team that

currently consists of six members who are considered subject matter experts. The hospital plans to add two more members to the disaster team in fiscal year 2008. Between the Office of Emergency Management, the Emergency Management Committee and the disaster team, Hopkins feels that this team, coupled with the vast in-house expertise in subject experts (medical subspecialties, hospital infrastructure, risk assessment in Epidemiology, infection control, safety, security, etc.), the hospital is more operationally grounded then other hospitals.

Through careful review and discussion between the Emergency Management Office and the Disaster Team members, Johns Hopkins Hospital decided to use a subset of the original eight categories and use the modified questionnaire as a tool to develop and improve current emergency preparedness and response processes. My position and task was to administer the survey, collect and analyze the results, compare the results with previous researched literature, and provide recommendations to the JHH Executive Staff regarding key knowledge gaps between specialty levels and overall preparedness capabilities.

*Purpose*

The purpose of this graduate management project is to assess and identify key gaps in the overall disaster preparedness of a major U.S. hospital and provide viable solutions to better prepare the hospital for a myriad of emergency management scenarios. To accomplish this, this project first provides an extensive literature review of the many concepts that encompass emergencies, disaster, and preparedness. The second part covers the selection and administration of a disaster preparedness survey to senior personnel at a major U.S. hospital to examine knowledge of overall hospital disaster and emergency preparedness, departmental

knowledge and preparation, and individual preparedness. The third part discusses the results of the survey and alternatives to close the gaps identified in the survey.

## Part One: Literature Review

This part of the graduate management project will provide an extensive literature review of the concepts that deal with disaster preparedness. To do so, this part of the project will first cover disaster terms and concepts. Then hospital preparedness terms and concepts will be reviewed. The third major area of review will be all hazards incident systems. The conclusion of this section of this part of the project will be a summary of these terms and concepts.

### *Incident Terms and Conditions*

This section will discuss several widely accepted definitions surrounding disaster preparedness. The definitions and conditions are taken from resources that are well regarded in the local, state, and federal communities. Although these definitions are widely accepted across multiple disciplines, they are not universal and rarely apply to each specific response level, community, or organization.

*Emergency.* In a broad context, an emergency can be defined as an incident or hazard that threatens public safety, health and welfare. The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) currently defines an emergency as a natural or manmade event that suddenly or significantly disrupts the environment of care; disrupts care and treatment; or changes or increases demands for the organization's services (JCAHO, 2003).

All emergencies tend to have an environmental component that can be classified by the type of hazard. The two most predominant types of hazards are natural hazards and human/technological hazards. Common types of natural hazards are,

but not limited to, geologic, atmospheric, seismic/volcanic, and hydrologic hazards. Common types of human/technological hazards are structural, fire, transportation, biological, radiological, and terrorism.

*Disaster.* Disasters are harder to define because no one universal definition of a disaster is used comparatively across academia and most definitions are too narrow or broad. A narrow definition is usually based on local response capabilities and a broad definition is usually based on large geographical and response areas. Local, state, federal, and international definitions range through a wide spectrum of cut-and-paste definitions to support their local audience.

JCAHO (2003) defines a disaster as a natural or man-made event that causes any of the following: (a) Significantly disrupts the environment of care (e.g., damage to the facility from a tornado or earthquake), (b) Significantly disrupts care and treatment (e.g., loss of utilities due to floods or emergencies within the organization), (c) Results in sudden, significantly changed, or increased demands for the organization's services (e.g., a bioterrorist attack, building collapse, or plane crash in the community).

JCAHO also refers to disasters as a Potential Injury Creating Events (PICE). A potential injury creating event is based on a system that uses a matrix to evaluate a particular disaster and the potential for additional casualties. The matrix takes into account the extent to which local resources are disrupted, the geographic boundaries involved, and the need for the use of outside resources. Although beneficial when evaluating the extent of a disaster, each matrix is usually based on a local systems capability and is rarely universal.

In many cases the literature narrowly defines the concept of disaster. The

Massachusetts Institute of Technology (MIT) currently defines a disaster as four casualties resulting from a single incident (Fry, 2001). The Emergency Management Database in Brussels, Belgium defines a disaster as ten or more people reported killed or 100 people reported affected. These narrow definitions usually reflect state definitions and often mirror the definition of a mass-casualty incident. A mass casualty incident can be summed up as an incident which generates more patients than available resources can manage. These resources are usually in relation to individual system capacity and operational procedures.

In reference to broad definitions, the Federal Emergency Management Agency (FEMA) defines a disaster as an occurrence such as a hurricane, tornado, flood, earthquake, explosion, hazardous materials accident, war, transportation accident, mass shooting, fire, famine, or epidemic that causes human suffering or creates human need that the victim cannot alleviate without assistance (FEMA, 2005). The World Health Organization (WHO) defines a disaster as an occurrence that causes damage, ecological disruption, loss of human life, or deterioration of health and health services on a scale sufficient to warrant an extraordinary response from outside the affected community area (WHO, 2004).

Similarly, in a broad context, the Federal Emergency Management Agency (FEMA) defines a disaster as an occurrence such as a hurricane, tornado, flood, earthquake, explosion, hazardous materials accident, war, transportation accident, mass shooting, fire, famine, or epidemic that causes human suffering or creates human need that the victim cannot alleviate without assistance (FEMA, 2005).

*Mass Casualty.* A mass casualty is an incident which generates more patients than available resources can manage using routine procedures. The

definition is linked to two critical but interrelated components: system capacity and operational procedures.

System capacity is a variable that is based on the following components:

- # of ambulances minus the # of ambulances out of service or on other duties
- # of available and qualified personnel
- personnel efficiency
- # of appropriate hospital beds minus the # of beds occupied by patients
- communications system capacity

Operational procedures consist of the procedures by which organizations operate and function. These can be routine or standing operating procedures or those performed during special events such as emergencies or disasters.

The goal of a mass casualty response is to save as many lives as possible based on current resources. With this in mind, the key issue of planning for a mass casualty event focuses on increasing the surge capacity of affected delivery systems through the mobilization and deployment of additional resources. A mass casualty generally exceeds system capabilities and therefore is extremely difficult to address in a comprehensive disaster plan.

*Differentiating Among These Terms.* The definitions of emergencies and disasters commonly refer to the same concepts; they both refer to the management of hazards that have developed into harmful events. An emergency often implies a smaller incident while a disaster often implies a larger-scale incident. The literature surrounding these two concepts is often ambiguous, intertwined, and too narrow or too broadly defined. The practical differences, however slight, are considerable and significant.

Based on the literature, there appears to be several disconnects and

inconsistencies surrounding the differences between a disaster and an emergency. The following examples illustrate the considerable and significant differences between the two and address several distinct differences.

The first example addresses an inconsistency in the literature surrounding supported definitions. FEMA defines a disaster as an occurrence (tornado, hurricane, etc.) that causes human suffering or creates human need that the victim cannot alleviate without assistance. The WHO's definition of a disaster is similar except that it states that the disaster must be "on a scale sufficient to warrant an extraordinary response from outside the affected community area." Acceptance of FEMA's definition of a disaster would suggest that if a tornado touched down and rendered one victim helpless, it would be considered a disaster. In reality, according to the literature, the definition given by FEMA for a disaster is actually the definition for an emergency because it does not address a distinction regarding the significance of the response or disaster. While the public commonly refers to items such as tornadoes and hurricanes as disasters the literature defines these as hazards and emergencies. Since an emergency is classified by hazards and hazards are classified by either natural or human/technological occurrences, an event could not be considered a disaster until the individual system capacity and operational procedures were overrun.

Although some researchers lump emergencies and disasters in the same field, the practical differences between the two in relation to preparedness are significant. In response to Hurricane Katrina, Dr. E. L. Quarantelli of the Disaster Research Center (DRC) at the University of Delaware explained the differences between emergencies and disasters and highlighted four key distinctions:

(1) In disasters compared to everyday emergencies, organizations have to quickly relate to far more and unfamiliar converging entities.

(2) Adjustment has to be made to losing autonomy and freedom of action. Since community and crisis time needs and values take precedence over everyday ones, all groups may be monitored and ordered about by social entities that may not even exist in routine times, or where the destruction of property is accepted to save lives in search and rescue efforts, or in the building of levees or firebreaks.

(3) Different performance standards are applied. For example, the normal speed of response and individualize care given to treating the injured is supersede by a need to curtail the level of care given to victims as well as spending time, efforts and resources on more equitably distributing the many victims in the available medical facilities.

(4) There is a much closer than usual public and private sector interface. The need for the quick mobilization of resources for overall community crisis purposes often preempts everyday rights and domains with private goods, equipment, personnel and facilities without due process or normal organizational procedures are often requisitioned or volunteered for the common good from everywhere and everyone, be they individuals or groups.

To give the discussion a better visual context, the second example refers to Figures 1, 2, and 3. These figures represent a specific disconnect between the terminology of "emergency" and "disaster" in common practices. The Emergency Systems for Advance Registration of Volunteer Health Professionals (ESAR-VHP) is a volunteer group that responds to state and federal general and public health emergencies. Before this group can respond, a local, state, or federal state of

emergency must be declared. Some states authorize declarations for emergencies and some states authorize declarations for disasters.

Although the declaration is the same for both categories, the terminology in the declaration varies between states. What one state considers an emergency, another state my consider a disaster and so forth. Figure 1 represents the states that use the term "emergency" in their declaration, Figure 2 represents the states that use the term "disaster" in their declaration, and Figure 3 represents the states that use both terms under the same meaning in their declaration. The source for all three figures is ESAR-VHP.


*Figure 1.* States that define hazards as emergencies.

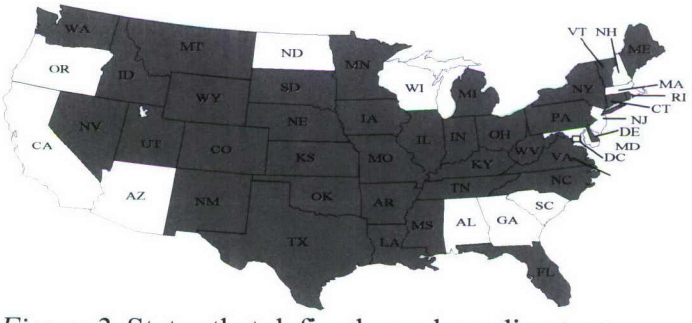


*Figure 2.* States that define hazards as disasters.

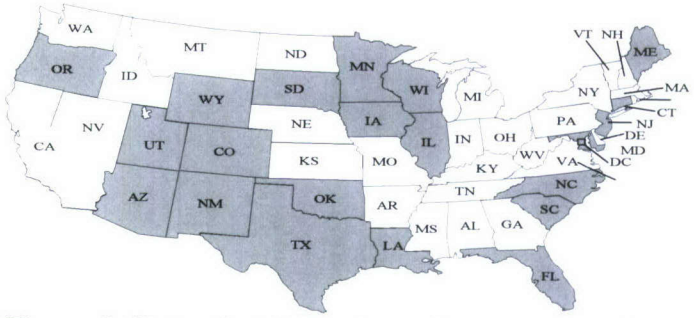


*Figure 3.* States that define hazards as emergencies and disasters.

The differentiation among these terms leads to several concerns: the first concern is that it may be improbable to assume that one universal definition for a disaster or emergency would ever be adopted by all agencies. Each system, whether it is local, state, or federal, has a different level of system capacity. Therefore, definitions need to be broad enough to encompass the universal idea, but also specific enough to meet local needs.

The second concern is the increasing trend to couple related terms due to shared similarities. The growing trend towards disaster and emergency agencies forming one single entity is decreasing the ability to draw a clear distinction between the two concepts. As separate agencies become one, so does the literature.

The third concern is that there have been few, if any, models that have been universally adopted for emergency and disaster management. It is understood that each agency has different needs and therefore would have different model variations, but a foundation from which to build on is lacking. Without the development of a universal model, literature, and more importantly, organizations, will continue to misuse standard definitions and will couple ideas and concepts until a clear distinction between the two is established.

*Section Summary.* The terms and conditions listed in the first section of the

literature review illustrate the fundamental concepts and definitions surrounding disaster preparedness. Based on the concepts and definitions listed, it is evident how broad definitions become increasingly ambiguous as they flow through multiple disciplines and local, state, and federal communities. In the past, the lack of standardized terminology and ambiguous definitions have made it virtually impossible to build acceptable cross-community models or universally accepted check lists. While it is not feasible to formulate a universally acceptable definition for emergencies and disasters that will satisfy all practitioners, it is imperative that a common and agreed upon definition be formulated in areas and fields concerned with emergencies and disasters. Natural and manmade/technological hazards should not automatically be defined as a disaster until individual system capacities and operational procedures have been maximized. The literature leads to several concerns that highlight a need to regain the distinction between emergencies and disasters and reinforce the conceptual progression from an incident or hazard, to an emergency, to a disaster. Although there is still much work to be done in this area, the introduction of all hazards approach models, an approach that proactively prepares an organization to respond to any event, has begun to bridge this gap and will be addressed in more detail later in this research.

*Incident Preparedness*

In a broad context, preparedness can be defined as the preparation and planning necessary to effectively handle an emergency or disaster. In 2006, Admiral John O. Agwunobi, Assistant Secretary of the Department of Health and Human Services defined "true preparedness" as having three levels:

(1) The ability to understand the unique nuances in any given hazard.
(2) The assurance of "modular general competencies."

(3) The creation of a culture of preparedness.

Hospital preparedness can assume several different shapes depending on which type of command structure is used and whether an all hazards approach is implemented. For instance, JCAHO does not require a hospital to adopt one specific form of command structure and response. JCAHO does require that a system be in place to meet a prior established minimum criteria set. The issue of importance is not which system or standard is used but rather it is understanding the fundamental levels of preparedness that must be addressed in each organization that should be understood first.

In a general context and not drawing from one specific hospital preparedness component or model, overall hospital preparedness is comprised of personal accountability, training and skills, knowledge and capability of staff, equipment and infrastructure, and plans and policies.

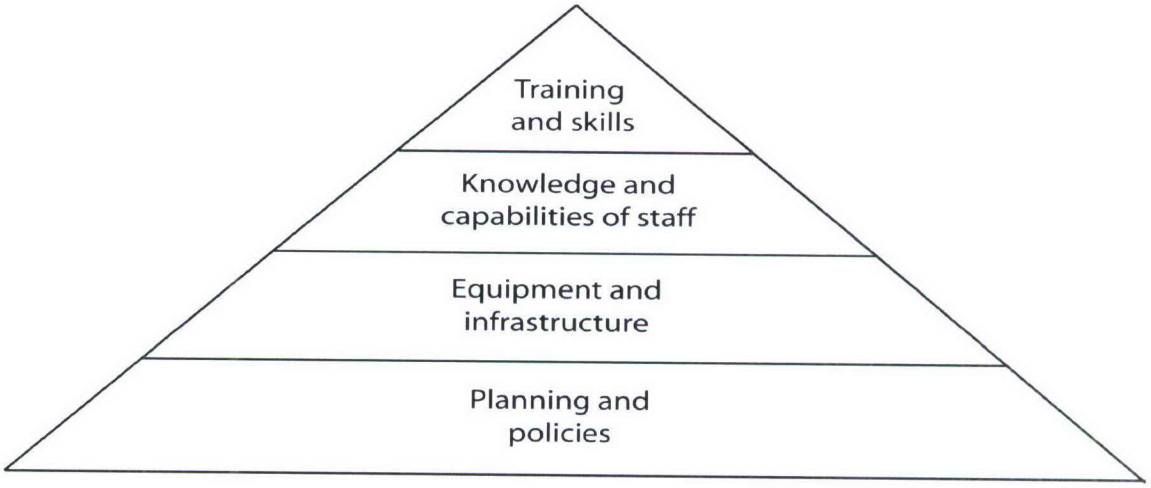


Figure 4. The Preparedness Pyramid. (Adini, 2006).

When taking this preparedness pyramid and contrasting it with an organization and its employees, it is important to note that in order for a hospital to possess overall basic preparedness, departmental and personal preparedness are also critical.

The concepts of personal and departmental preparedness are not referenced in the preparedness diagram in Figure 4 but do move fluidly up and down through each level. This will be discussed further in this project but in order to understand the fundamental concepts of overall preparedness, the following statements must be understood when referencing the preparedness pyramid and the following hospital preparedness section:

(a) Policies and procedures can be written to meet the need of the overall organization but if they are not tailored to meet the function of the department, overall preparedness cannot exist.
(b) Departments must align training and skills to meet the overall needs of the organization in the event of a disaster.
(c) Each level of the preparedness pyramid cannot exist if personal accountable is not first established. Departments must mandate family preparedness to ensure that staff can comply with shelter in place scenarios or respond to the facility in the event of a disaster.

*Emergency Management Plan.* An emergency management plan (also called a disaster plan) describes how the organization will establish and maintain a program to ensure effective response to disasters or emergencies affecting the environment of care. The plan should address four phases of emergency management activities: mitigation, preparedness, response, and recovery.

Mitigation efforts attempt to prevent hazards from developing into disasters all together or to reduce the effects of disasters when they occur. The mitigation phase differs from the other phases because it focuses on long-term measures for reducing or eliminating risk.

In the preparedness phase, emergency managers develop plans of action for when a disaster strikes. Common preparedness measures include:

- Communications with easily understood terminology and chain of command development and practice of multi-agency coordination and incident command structure
- Development and exercise of emergency population warning methods

combined with emergency shelters and evacuation plans
- Stockpiling, inventory, and maintenance of supplies and equipment

The response phase includes the mobilization of the necessary emergency services and first responders in the disaster area. This is likely to include a first wave of core emergency services.

The aim of the recovery phase is to restore the affected area to its previous state. It differs from the response phase in it focus. Recovery efforts are concerned with the issues and decisions that must be made after immediate needs are addressed.

All organizations must have an emergency management plan that addresses each of the four phases of emergency management so that patient/resident/client care can be continued effectively in the event of an emergency situation. The plan should address both internal and external disasters while allowing specific responses to the types of disasters likely to be encountered by the organization.

*Response Scenarios.* Response scenarios help organizations plan to respond to different events that may occur. These response scenarios are often based on the results of a Hazardous Vulnerability Analysis (HVA). The California Emergency Preparedness Project has used HVAs to develop preparedness strategies according to the likelihood of the different types of events the organization could face. For instance, New York City should probably spend more resources than Topeka, Kansas, on preparation for biological or nuclear attack; Topeka, on the other hand, should focus more of its preparedness efforts on tornados. Prior to the adoption of an all hazards approach, HVAs were used to create separate individual plans for each contingency. Although the HVA was beneficial in directing the organization to develop separate plans based on geographical location, community demographics, response capabilities, and other factors, it proved impractical and was often difficult

to update. These individual plans were only beneficial if the scenario had been planned for and often left little discussion to scenarios that were not produced in the HVA.

In recent years, the federal government has promoted the idea of preparing for all hazards. Instead of creating individual plans for different scenarios, an all hazards approach focuses on developing capacities and capabilities that are critical for a full spectrum of emergencies and disasters. This approach often takes the resources needed for every emergency and standardizes those into the full disaster plan. Certain subsections are then stressed based on the results of the HVA. It is also important to note that an all hazards approach does not only address the HVA and disaster plan, but it also seeks to change the attitudes and behaviors so that when a disaster strikes, our citizens, community and infrastructure are prepared.

*Section Summary*. Based on Figure 4, basic hospital preparedness should include training and skills, knowledge and capability of staff, equipment and infrastructure, and plans and policies. Within this infrastructure, personal and departmental preparedness must also be addressed when evaluating overall preparedness. True preparedness does not exist unless each person and department is aligned with the organizations overall disaster plan.

Disaster plans ensure effective response to emergencies and should address internal and external scenarios in response to mitigation, preparedness, response and recover. The disaster plan should take an all hazards approach but also prioritize capabilities based on the likelihood of certain events.

*All Hazards Incident Systems*

Incident systems play a critical role in saving human lives and minimizing the

damages to various types of properties in the event of incidents such as flood and terrorist attack. Modeling of incident command and control workflows allows the examination of potential issues in the incident response procedures. These procedures have evolved though learning from different types of catastrophic events and the multi-system involvement of local, state, and federal agencies. Since the attacks on September 11th and the devastation caused by Hurricane Katrina, two significant benchmarks were created for preparedness: the National Incident Command System (NIMS) and the Hospital Emergency Incident Command System (HEICS). Both were established to help bridge the gap between different jurisdictions and disciplines and to bridge the communication gap that often presents itself in incidents.

*National Incident Management System (NIMS).* The National Incident Management System establishes standardized incident management processes, protocols, and procedures that all responders, be they Federal, state, tribal, or local, will use to coordinate and conduct response actions. With responders using the same standardized procedures, they will all share a common focus, and will be able to place full emphasis on incident management when a homeland security incident occurs, whether terrorism or natural disaster. In addition, national preparedness and readiness in responding to and recovering from an incident is enhanced since all of the Nation's emergency teams and authorities are using a common language and set of procedures (U.S. Department of Homeland Security, 2006).

In relation to preparedness, preparedness incorporates a range of measures, actions, and processes to be accomplished before an incident happens. NIMS preparedness measures planning, training, exercises, qualification and certification,

equipment acquisition and certification, and publication management. All of these processes serve to ensure that pre-incident actions are standardized and consistent with mutually-agreed upon doctrine. NIMS further places emphasis on mitigation activities to enhance preparedness. Mitigation includes public education and outreach, structural modifications to lessen the loss of life or destruction of property, code enforcement in support of zoning rules, land management, and building codes, and flood insurance and property buy-out for frequently flooded areas. The National Incident Management System has not only proven beneficial in standardizing terminology and definitions, but it has also proven beneficial in bridging the gap between the local, state, and national levels.

*Hospital Emergency Incident Command System (HEICS).* The Hospital Emergency Incident Command System (HEICS) is an emergency management system which employs a logical management structure, defined responsibilities, clear reporting channels, and a common nomenclature to help unify hospitals with other emergency responders. There are clear advantages to all hospitals using this particular emergency management system. HEICS has become the standard for health care disaster response and offers the following features (U.S. Department of Homeland Security, 2006):

- Predictable chain of management
- Flexible organizational chart allows flexible response to specific emergencies
- Prioritized response checklists
- Accountability of position function
- Improved documentation for improved accountability and cost recovery
- Common language to promote communication and facilitate outside assistance
- Cost effective emergency planning within health care organizations

*Summary*

The literature review in the first part of this graduate management addresses the definitions, concepts, and differentiations surrounding standard preparedness terminology, hospital preparedness and the four phases of emergency management, and all hazard incident systems. The definitions, concepts, and term differentiation section illustrate how broad definitions can become increasingly ambiguous as they flow through multiple disciplines and local, state, and federal communities. In the past, the lack of standardized terminology and ambiguous definitions has made it virtually impossible to build acceptable cross-community models or universally accepted check lists. While it is not feasible to formulate a universally acceptable definition for emergencies and disasters that will satisfy all practitioners, it is imperative that a common and agreed upon definition be formulated in areas and fields concerned with emergencies and disasters.

The hospital preparedness section illustrates the four phase of mitigation, preparedness, response, and recovery in the emergency management structure. These four phases represent the foundation of emergency management. Within these phases also exists the opportunity to build and expand upon ideas and principles based on emerging trends and lessons learned from cross-community incidents. Growing trends such as family preparedness plans represent the opportunity to reach past current models and strive to achieve true overall preparedness.

The all hazards incident systems section discusses the National Incident Management System (NIMS) and the Hospital Emergency Incident Command

System (HEICS). Both systems are based on an all hazards approach by developing capacities and capabilities that are critical for a full spectrum of emergencies and disasters. They have both helped bridge the gap between the local, state, and national levels by standardizing procedures, protocols, terminology and communication during emergency situations. Hazard vulnerability analyses are still used in an all hazards system but instead of being used to develop processes to respond to a single event, they are now used to plan for multiple events and prioritize the likelihood of certain events.

## Part Two: Survey Instrument

Part Two of this project will cover the survey instrument that was administered at John Hopkins. This part of the project will provide more detail about the history of the original survey developed by AHRQ. It will follow with a discussion of the sample and the methods and procedures for administering the survey.

### *Background*

In 2006, the Trust for America's Health (TFAH), a non-profit, non-partisan organization released its fourth annual "Ready or Not? Protecting the Public's Health from Disease, Disasters, and Bioterrorism," report. The report concluded that Maryland (grouped with the District of Columbia) achieved only four of the ten possible indicators. Maryland ranked in the lowest percentile along with California Iowa, and New Jersey. Jeff Levi, PhD, Executive Director of TFAH concluded that "September 11, the anthrax attacks, and Hurricane Katrina were all wake up calls to the country, putting us on notice that the nation's response capabilities were weak and that we needed to improve preparedness (Trust for America's Health, 2006). The following graph illustrates the report issued by TFAH:

| | Indicator | Maryland | Number of States Receiving Points |
|---|---|---|---|
| | *A checkmark means the state received a point for that indicator* | | |
| 1 | Achieved "green" status for Strategic National Stockpile Delivery | | 15 |
| 2 | **Has sufficient BSL-3 labs to meet bioterrorism preparedness needs as outlined in state plan** | | **39** |
| 3 | Has enough lab scientists to test for anthrax or plague | ✔ | 46 and D.C. |
| 4 | **Has year round lab-based influenza surveillance** | ✔ | **46 and D.C.** |
| 5 | Has two weeks hospital bed surge capacity in moderate pandemic | | 25 and D.C. |
| 6 | **Increased or maintained seasonal flu vaccination rate for adults over age 65** | | **37 and D.C.** |
| 7 | At or above national median for number of adults over age 65 who have ever received a pneumonia vaccination | | 26 |
| 8 | **Is compatible with the CDC's National Electronic Disease Surveillance System** | ✔ | **38** |
| 9 | Does NOT have a nursing workforce shortage | | 10 |
| 10 | **Increased or maintained level of funding for public health services from FY 2005 to FY 2006** | ✔ | **44 and D.C.** |
| | **Total** | **4** | |

*Figure 5.* Ready or Not? Protecting the Public's Health from Disease, Disasters, and Bioterrorism, 2006.

This report not only alerted Maryland hospital's about their low performance in national preparedness indicators, it also caused Johns Hopkins Hospital to take a closer look at its overall preparedness level. This report, coupled with the AHRQ Preparedness for Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE) Events Questionnaire, gave Johns Hopkins the opportunity to use the

new questionnaire to assess key areas of its overall preparedness.

*Sample*

*Baltimore-Washington Area.* In 2000, the U.S. Census Bureau ranked the Northern Virginia, District of Columbia, and the Maryland area as the 7th highest Metropolitan Statistical Area in the nation. The metropolitan city of Baltimore boasts tourism through the popular Inner Harbor, National Aquarium, the Baltimore Ravens who play at the 70,000+ seat M&T Bank Stadium, and the Baltimore Orioles who play at the 40,000+ seat Camden Yards. The two professional sporting arenas are less than 15 blocks from the city center and less than three miles from Johns Hopkins Hospital.

Rail, road, and air connections also make Baltimore attractive for industry, manufacturing, and trade. Today, however, Baltimore's economy focuses on research and development, especially in the areas of aquaculture, pharmaceuticals, and medical supplies and services. In addition to private laboratories, the city is home to more than 60 federal research laboratories ("Baltimore," Microsoft® Encarta® Online Encyclopedia, 2007). Baltimore also has one of the world's largest natural harbors. With one of the busiest ports in the U.S., the channels of the Patapsco River provide direct access to the heart of Baltimore and lies only two miles from Johns Hopkins Hospital.

Baltimore and the local surrounding area include 8 major interstate highways, 4 U.S. highways, the Harbor Tunnel, Fort McHenry Tunnel, and the Francis Scott Key Bridge. The Maryland Transit Administration (MTA) includes several means for public transit, but features a metro subway, light rail, and MARC train system. The light rail services downtown Baltimore, BWI Marshall Airport (less than 20

miles away) and Amtrak's Penn station (less than 3 miles away). It's important to note the metro services because the metro subway that services the northwest and southeast portions of Baltimore leads directly underground to the heart of the Johns Hopkins East Baltimore Campus.

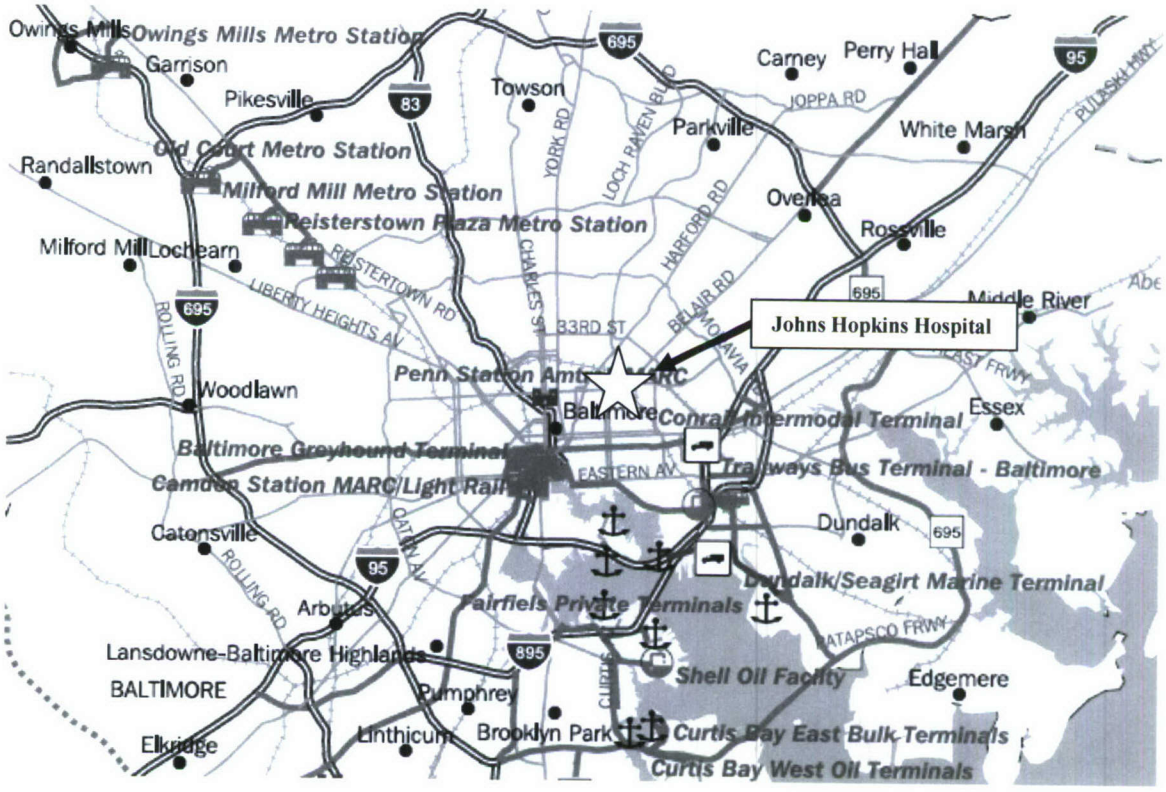


*Figure 6.* Baltimore and surrounding area.

*Johns Hopkins Hospital East Baltimore Campus.* Since its opening in 1889, The Johns Hopkins Hospital has long been regarded as a premier institution for healthcare in the U.S. In 2006, Johns Hopkins Hospital received recognition as the number one hospital in the United States from the *U.S. News & World Report's* for the 16th straight year. Johns Hopkins Hospital is interconnected between 20 different buildings and is located at the heart of the East Baltimore Campus. The surrounding area is comprised of multiple research and administrative buildings, the Bloomberg School of Public Health, Kennedy Krieger Institute, and the School of

Nursing.

At a glance, Johns Hopkins Hospital has over 8,500 employees, 1,017 licensed patient beds, over 47,000 admissions, and over 730,000 outpatient visits per year. The School of Medicine, including faculty, employees, and medical students has over 13,500 personnel alone (Hopkins Pocket Guide, 2007). Combining these two institutions with other various research, administrative, academic, and patient care buildings on the campus and the magnitude and depth of the East Baltimore Campus is phenomenal.

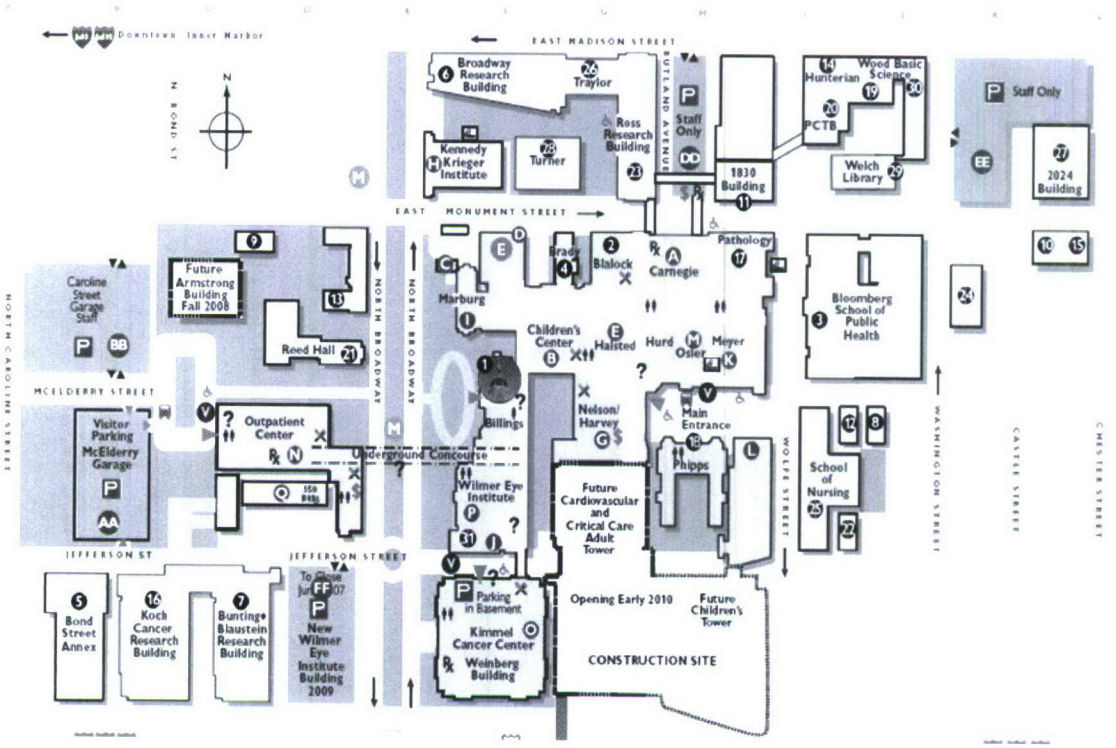


*Figure 7.* Johns Hopkins East Baltimore Medical Campus.

*Survey Instrument*

As pointed out in the introduction, a nationally accepted survey instrument for emergency or disaster preparation was developed in April 2007. It was on this date that the AHRQ published a 48 question survey on emergency and disaster preparedness that the agency had been working on since 2005. AHRQ contracted

with Booz Allen Hamilton to develop the CBRNE survey through advice and consultation of an expert panel. The panel consisted of medical subject matter experts trained and experienced in the hospital care of victims of chemical, biological, radiological, nuclear, and/or explosive events. Funding for the survey was provided by the U.S. Department of Health and Human Services (DHHS) and the Health Resources and Services Administration (HRSA).

Booz Allen Hamilton also provides a wide range of products and services tailored to the Department of Defense and its unique requirements of CBRNE missions. These include but are not limited to strategic and business planning, logistical planning and analysis, training and exercise support, and special studies. The CBRNE questionnaire was designed to collect information on CBRNE preparedness activities and, in particular, response activities that are the responsibility of and under the control of hospital leadership. The questionnaire covers activities that could be executed by both large and small hospitals and is also intended for use in national planning, program planning, setting priority areas to address current and future needs, as well as ensuring that scarce resources are being used in a way that achieves the most impact in preparedness.

*Target Sample Description*

The sample target population for the survey (N=85) was defined as Departmental Disaster Coordinators, Emergency Management Committee members, Directors of Nursing, Disaster Team members, and departmental administrators and assistant administrators of Johns Hopkins Hospital. The target sample population was established by Howard Gwon, the Disaster Preparedness Coordinator JHH.

*Unit of Analysis*

The unit of analysis in this study was at the individual level. The sample target population was surveyed and asked to provide their responses to the questions. Responses will be looked at individually and then added together to provide a score for JHH as a whole entity.

*Methods and Procedures*

This section will discuss the study design, objectives, and questions selected. The original AHRQ questionnaire consisted of 43 questions that sought to address administration and planning, education and training, communication and notification, patient (surge) capacity, staffing and support, isolation and decontamination, supplies, pharmaceuticals, and laboratory support, and surveillance. When Mr. Gwon and the JHH Emergency Management Committee analyzed the original survey, it was decided that only a specifically-selected subset of questions would be used for the purpose of this project. Mr. Gwon and the committee feared that administration of the entire survey would produce negative results that would not prove beneficial to assessing key preparedness areas and might ultimately harm preparedness.

As mentioned in the introduction portion of this project, JHH did not have a full-time disaster preparedness coordinator until 2007. Several key areas, such as training, policies and procedures, departmental preparedness, and personal preparedness were selected as key areas affected by the lack of a dedicated disaster preparedness coordinator. Due to the timeliness of the AHRQ questionnaire and the decision to use a specifically-selected subset of questions, the objectives for this study were selected prior to establishing the subset of questions. The intent was to

select questions that would provide insight into prior established areas of interest. Therefore, for the purpose of this project, the objectives and expected findings were developed at the same time.

*Objectives and Expected Findings.* The specifically-selected subset of questions sought to address the following objectives and expected findings (Table 1):

Table 1: Objectives and Expected Findings

| OBJECTIVES | EXPECTED FINDINGS |
|---|---|
| #1 Identify gaps in perception between overall hospital and departmental preparedness | Departmental preparedness perception would be lower than overall hospital preparedness perception |
| #2 Determine whether the sample population felt current training protocols prepared them for CBRNE/all hazards event | Departmental level protocols may be adequate but inadequate in terms of individual training protocols |
| #3 Assess whether departments utilized an Incident Command System in their departmental preparedness plans | Departmental business continuity plans lack an all hazards approach |
| #4 Assess whether departments utilized individual and family preparedness plans | The use of family preparedness plans would be low or non-existent |
| #5 Assess the overall perception of individual preparedness | The overall perception of individual preparedness would be high based on the pre-defined sample population |

*Questions Selected.* As noted previously, the original AHRQ questionnaire consisted of 43 questions and JH opted to use a specifically-selected subset of questions for this project. Appendix A provides a listing of all 43 questions from the original ARHQ questionnaire. Appendix B provides a cross-walk of the original AHRQ questionnaire and the questions selected and adapted by JH for use in this project. Three questions were added by JHH. Appendix C contains the 21 question survey used in this project and each question is mapped to the five objectives noted in Table 1. All questions except for Question #19 were answered

on a yes, no, or don't know basis. Question #19 asked respondents to identify how many training sessions on hazards preparedness they attended during the previous 12 months. Answers were marked in one of five categories responding to a finite number of sessions. This question will be described more below. All questions will be discussed next.

To identify gaps in perception between overall hospital and departmental preparedness (Objective 1) JHH selected the following questions:

Q1: Does Johns Hopkins Hospital have a designated coordinator (or group/committee) responsible for overseeing all of the hospital's hazards preparedness efforts, including Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE)?

Q2: Does Johns Hopkins Hospital have a dedicated system for staff information and call-in inquiries during a CBRNE/all hazards event?

Q3: Does the John Hopkins Hospital CBRNE/all hazard plan address policies and procedures for increasing inpatient bed capacity?

Q4: Is mental health support available as a component of the care provided to staff in a CBRNE/all hazards event?

Q5: Does the Johns Hopkins Hospital CBRNE/all hazard address decontamination and negative pressure needs?

Q6: Has Johns Hopkins identified and stockpiled contingency supplies needed during a CBRNE/all hazards event?

Q7: Does your department have a designated coordinator responsible for overseeing and responding to all hazards events, including Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE)?

Q8: Does your department use an Incident Command System (ICS) approach to manage events that impact normal operations?

Q9: Does your department have CBRNE procedures associated with the overall hospital policy and procedures that are reviewed and updated?

Q10: Does your department have a dedicated system for staff information and call-in inquiries during a CBRNE/all hazards event?

Q11: Does your departmental CBRNE/all hazard plan that addresses procedures for expanding staff availability (e.g. callback lists, policies for overtime, staffing centers, etc.) during a CBRNE/all hazard event?

Q12: Has your department identified and stockpiled contingency supplies needed during a CBRNE/all hazards event?

Question 8 was also used as the basis for Objective 3. The results for Q8 were used in the computation of Objective 1 and solely used for the computation of Objective 3.

To determine whether the sample population felt current training protocols prepared them for CBRNE/all hazards event (Objective 2), JHH selected the following questions:

Q17: Have you participated in a Johns Hopkins-wide or regional CBRNE/all hazards exercise or drill in the past 5 years?

Q18: Does Johns Hopkins provide competency-based training on hazards preparedness efforts, including Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE)?

Q20: Did the hazards preparedness training increase your level of knowledge and readiness?

To assess whether departments utilized an Incident Command System in their departmental preparedness plans (Objective 3), JHH selected the following questions:

Q8: Does your department use an Incident Command System (ICS) approach to manage events that impact normal operations?

To assess whether departments utilized individual and family preparedness plans (Objective 4), JHH selected the following question:

Q13: Does your department keep on file individual and family preparedness plans for all your staff?

To assess the overall perception of individual preparedness (Objective #5), JHH selected the following questions:

Q19: How many training sessions on hazards preparedness have you attended during the past 12 months?

Q21: Do you feel that you've been adequately trained to respond to a CBRNE/all hazards event?

Responses from Q19 were not used in the final computation of this section. The results were only used as a comparison figure to look for any association between the overall perception of individual preparedness and the amount of training sessions attended in a 12 month period. Five different categories were used to better analyze any threshold that may exist between the number of training sessions per year.

*Means of Gathering Data.* Data was collected via Vovici, an interactive

web page where respondents remained anonymous and data was collated and distributed from a third party. The information technology department at Johns Hopkins Hospital was used to develop the interactive web page and the internal marketing department was used in gathering and forwarding the data collected from the Vovici program.

After the web page was created and prior to dissemination, the web page was tested by four personnel in the marketing division to ensure reliability and to test Vovici's functional data collection capabilities. After the successful completion of all four tests, an email was sent out by Howard Gwon to the target population with a direct link to the questionnaire. The email sent to the target population consisted of an explanation about the questionnaire, the reason for conducting the questionnaire, and directions on how to complete the survey. Once the survey was completed by each individual respondent, the results were automatically sent to the Vovici coordinator in the marketing division at Johns Hopkins Hospital.

The survey was conducted over a three day period and the results were forwarded to me at the end of each day. During the three day period, a reminder email was sent to the target population each morning by Howard Gwon to stress the importance of max participation. After the first day, ten percent of the total response rate had been received. The second day produced a response rate of sixty percent. At the end of the third day, the remaining thirty percent of the total response rate was received. Of the questionnaires distributed during a three day period, 35 were returned for a total response rate of 41%.

*Validity and Reliability.* The questionnaire was developed through an AHRQ contract with Booz Allen Hamilton, with the advice and consultation of an

expert panel. The panel consisted of medical subject matter experts trained and experienced in the hospital care of victims of chemical, biological, radiological, nuclear, and/or explosive events. Some questions were modified to distinguish between hospital and department, but the content and subject matter of the question remained the same.

Content validity was used in choosing the sample population for this questionnaire. Since the sample population was defined as departmental disaster coordinators, Emergency Management Committee members, Directors of Nursing, Disaster Team members, and departmental administrators and assistant administrators, a certain amount of knowledge and expertise is expected with their given position and respected opinion. Reliability in regards to future test-retest will be addressed further in the recommendations section of this study.

*Limitations.* The Booz-Allen team examined several assessment tools and preparedness questionnaires, most of which emphasized management of specific biological agents rather than broader planning issues. The researchers also found that there were no nationally accepted benchmarks of adequate preparedness, and that there was no mechanism in place to share best practices or useful solutions (AHRQ Publication No. 04-P007).

*Scoring.* There were a number of obstacles to overcome in terms of scoring of this survey. First, with a target sample size of only 85, it was very probable that obtaining statistical significance on any of the questions or objectives would not be achievable. This was compounded by the fact that at least one of the objectives (Objective #1) involved a comparison format, a format that would only exacerbate the statistical significance issue. Second, since a survey of this type had never been

administered before, there was no established threshold of adequacy for any of the objectives. Therefore, in this sense, this project is exploratory in nature and will require much additional work before actual changes are implemented at JHH. Further compounding this obstacle is the notion that hospitals will probably vary in their level of comfort in terms of threshold depending on a number of factors, such as their age, national reputation, and political factors surrounding their organization. In light of these obstacles, scoring for each objective was established as follows:

Objective #1. Particular attention will be paid to any of the 12 questions used for this objective in which more than 80% of the respondents indicated "no". To determine if the expected finding occurred or not, the following methodology will be used. The total number of all responses will be calculated. A "yes" ratio for overall hospital preparedness (Q1-Q6) and departmental preparedness (Q7-Q12) will be calculated by simple division (# yes responses/# total responses). A comparison of the two ratios for each area (overall hospital preparedness versus departmental preparedness) will then be computed. The perception of departmental preparedness will be considered lower than overall hospital preparedness if the "yes" ratio for Q7-Q12 is lower than the "yes" ratio for Q1-Q6.

Objective #2. Adequacy for the individual level preparation for CBRNE/All Hazards events will be assessed using an 80 percent rule and a "yes" ratio. That is, the individual training protocols will be considered adequate if the "yes" ratio for responses to Q17-18 and Q20 is 80 percent or higher.

Objective #3. Departmental business continuity plans (Q8) will also use a "yes" ratio. That is, departmental business continuity plans will be considered lacking an all hazards approach if 80% of the respondents fail to indicate "yes".

Objective #4. The use of family preparedness plans (Q13) will be considered high if 60 percent indicate "yes", low if 20 percent indicate "yes", and non-existent if 20 percent or less indicate "yes".

Objective #5 This objective will also employ a "yes" ratio. The overall perception of individual preparedness will be considered high if the "yes" ratio for Q21, is at least 60 percent. Additionally, responses from Q19 will be compared against Q20 to determine if there is any relationship between the number of training sessions attended and individual preparedness.

*Utility of Results.*

The utility of the results has the potential to positively impact the way JHH prepares and trains for a CBRNE/all hazards event in the future. Since the objectives and expected findings were developed at the same time, the key participants who participated in developing the subset of questions had a preconceived idea about key areas they felt needed to be addressed. The results of the survey would either reaffirm the expected outcomes or serve to transition their efforts to other key areas in the preparedness spectrum. Either way, the results would ultimately give JHH the ability to tailor future training and preparedness strategies towards overall preparedness.

## Part Three: Results and Discussion

This part of the project will discuss the survey results and implications. The survey results will be discussed in sections. The first section will discuss overall results in three categories of concern: (1) General knowledge regarding Johns Hopkins Hospital overall CBRNE/all hazards events and procedures, (2) General knowledge regarding departmental CBRNE/all hazards events and procedures, and

(3) Departmental and individual education and training perception. The second section will deal specifically with the five objectives set forth in this project. A discussion section will describe what JHH did with the results. This part will conclude with additional research that JHH required as a result of the initial findings.

*Overall Results*

Overall, the results were consistent with the expected findings established by Howard Gwon and the emergency management committee. The results acted more as a reaffirmation that the key areas selected in the survey needed to be addressed in future preparedness planning.

*General Knowledge about JHH.* Questions 1-6 assessed the general knowledge of CBRNE/All Hazards procedures and protocols for JHH as a whole. For this sample, the mean population answering "yes" was 86.5%, "no" was 0.5%, and "don't know" was 13%. These figures indicate that a very high portion of the respondents were aware of the overall CBRNE/All hazards procedures and procedures that JH possesses.

*General Knowledge about Departmental Procedures and Policies.* Questions 7-14 assessed the general knowledge of respondents in regards to departmental protocols and procedures for CBRNE/All Hazards Events. For this sample, the mean population answering "yes" was 62%, "no" was 28%, and "don't know" was 10%. Again, this confirmed expectations that respondents were generally aware of departmental procedures and policies but that improvement could be made in this area.

*Departmental and Individual Training.* A third set of questions (Questions

15-18 and Questions 20-21) assessed perceptions regarding hospital and departmental education and training procedures and protocols for CBRNE/All Hazards Events. For this sample, the mean population answering "yes" was 52%, "no" was 33%, and "don't know" was 15%. As with knowledge about departmental procedures and policies the percentage of the respondents answering "yes" was lower than desired but approximately at the level of expectation by JHH.

*Objectives and Findings*

*Objective 1.* Objective 1 sought to identify gaps in perception between overall hospital and departmental preparedness. The expected findings were confirmed. First, none of the twelve questions produced a "no" ratio of 80 percent or higher. Second, the "yes" ratio for general knowledge about departmental procedures and policies (Q7-Q12) was 77% and the "yes" ratio for general knowledge about overall hospital preparedness was 87%. Thus, the departmental preparedness perception was lower than the overall hospital preparedness perception.

*Objective 2.* This objective considered whether the sample population felt current training protocols prepared them for CBRNE/All Hazards events. The expected findings were confirmed. The "yes" ratio for respondents on Questions 17-18 and Question 20 was only 66%, falling shy of the prescribed 80 percent threshold that was established during Part Two of this project. 17% of the respondents marked "no" on this question and 17% marked "don't know".

*Objective 3.* This objective assessed whether departments utilized an Incident Command System in their departmental preparedness plans. The expected findings were confirmed. Only 74% of the respondents marked "yes" on Question

8, again falling just short of the 80 percent threshold that was established during Part Two of this project. 20% of the respondents marked "no" on this question and 6% marked "don't know".

*Objective 4.* This objective assessed whether departments utilized individual and family preparedness plans. The expected findings were confirmed. On Question 13, only 9% of the respondents noted that their department kept individual and family preparedness plans on file, falling well short of the 80% threshold that was established during Part Two of this study. Further, 74% of the respondents marked "no" on this question and 17% marked "don't know on this question.

*Objective 5.* This objective assessed the overall perception of individual preparedness. The expected findings were somewhat confirmed. As stated previously, the "yes" ratio for Q21 was 54%, falling just short of the 60 percent threshold established in Part Two of this project. Analysis of how many training sessions on hazards preparedness the individuals had attended in the previous twelve months (Q19) indicated that a large portion of the individuals had not attended training. From the results, 9 respondents (26%) did not attend any training sessions, 20 respondents (57%) attended less than 4 training sessions, and only 6 respondents (17%) attended more than 5 training sessions during the past 12 months.

*Discussion*

After the survey was conducted and all the responses had been received and compiled, Howard Gwon and the Emergency Management Committee met to discuss the results. Both the overall results and the findings on the five objectives were critically examined. As indicated previously, the results confirmed senior

level perceptions about the preparedness levels at JHH. At the conclusion of the review, the committee selected two areas of importance for follow-up work. One area dealt with education, training, and exercise design and the other dealt with individual and family preparedness plans.

Education, training, and exercise design was very important to JHH because while they did not have a full-time disaster coordinator until 2007, they had conducted numerous training exercises in preparation for events such as these. Yet, despite those efforts, thirty-seven percent of the respondents stated that they did not feel adequately trained to respond to a CBRNE/all hazards event. Additionally, fifty-seven percent of the respondents indicated that they had attended less than four training sessions in the previous twelve months.

Individual and family preparedness was a new issue for JHH. This issue has always been a subject of military preparedness, but was only recently highlighted as a need for civilian organizations by the events of 9-11 and Hurricane Katrina. Since seventy-four percent of the respondents indicated that departments failed to utilize individual and family preparedness plans, this was an immediate area of concern for JHH.

*Education, Training and Exercise Design*

Based on the results from the JHH survey, disaster drill participation and staff education and training were key areas where Johns Hopkins could increase their overall level of preparedness. In 2006, Johns Hopkins Hospital conducted 18 separate training opportunities for staff, 4 satellite drills and conducted 9 hospital-wide drills, over four times the amount mandated by JCAHO. The following graph illustrates the increase from 2003-2006 in hospital-wide readiness drills and disaster

and preparedness training opportunities for Department Disaster Coordinators, Shift Coordinators, Managers and others.

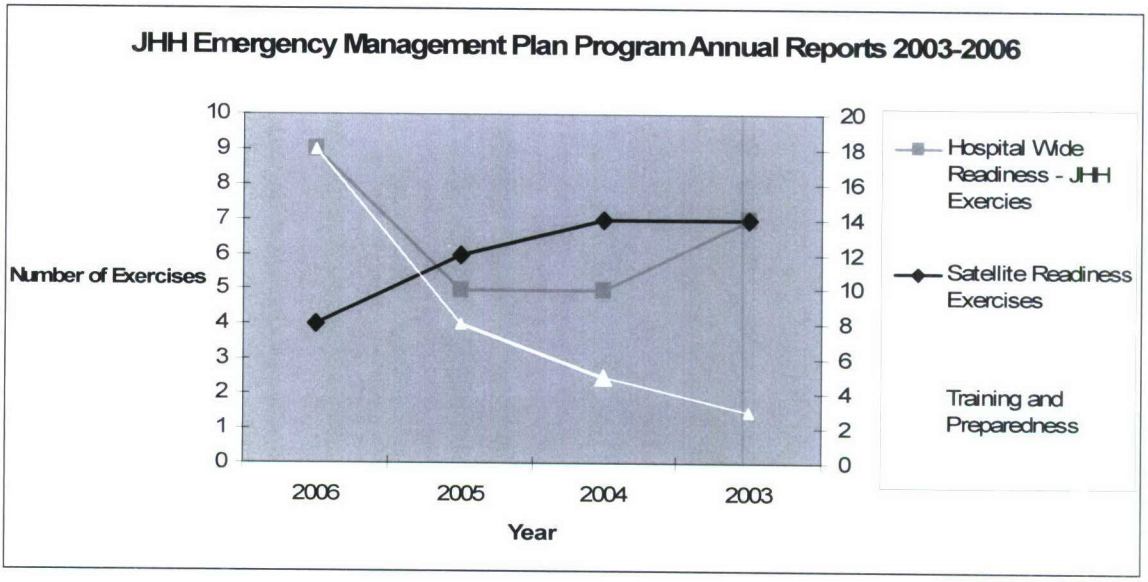


*Figure 8*. JHH Emergency Management Plan Program Annual Reports 2003-2006.

JCAHO requires two disaster drills per year. One of those two drills can be a table-top-drill; only one of them must involve a simulation or actual influx or patients. The fact that most hospitals comply with this requirement could lead to an assumption that most hospital staff are adequately educated and trained to effectively manage disasters (Powers, 2007).

Disaster drills and staff education and training are both in the same realm of preparedness. The purpose of drills, tabletop exercises and competency-based training is to: teach hospital staff to respond to a myriad of scenarios; validate the readiness and effectiveness of the hospital's disaster management plan; make new hospital staff to become aware of procedures in disaster response; use the reports from the drill to reinforce strengths and weaknesses. These assessments are the key component to bridging the gap in hospital preparedness and response capabilities. However, disaster preparedness training is time-consuming, expensive and may

divert resources away from other important needs. Moreover, the degree to which training is effective is not known (Catlet, Hsu, & Jenckes, 2004).

In 2004, the Johns Hopkins University Evidence-based Practice Center (JHU-EPC) identified and reviewed the published evidence on the training of staff to respond to a Mass Casualty Incident (MCI). The purpose of the research sought to answer three questions:

- What is the effectiveness of disaster drills in training hospital staff to respond to an MCI?
- What is the effectiveness of technology-based interventions in training hospital staff to respond do an MCI?
- What is the effectiveness of tabletop exercises in training hospital staff to respond to an MCI?

The study concluded that the evidence is not yet strong enough to make definitive recommendations as to the best type of training. However, some general statements were made about the various training techniques. The study determined that there is little objective and statistical data in the literature to show that patient through-put time increased based on the type of training. However, the literature did consistently describe disaster drills effective in the following ways:

- Allowed hospital employees to become familiar with disaster procedures
- Allowed identification of problems with different response capabilities
- Provided the opportunity to apply lessons learned to disaster response

Although minimal data was provided to evaluate the effectiveness of technology-based education, one study evaluated the use of computer simulated training. Managers found the simulated training helpful when managing the through-put of patients and decreasing assessment and treatment times. Due to the limited amounts of literature, it is still difficult to measure how this type of training increases the effectiveness to respond to an actual physical scenario.

Only one study addressed the use of tabletop exercises. Reviewers found that tabletop exercises allow participants to communicate and engage in issue resolution both within their medical facility and with outside agencies. One significant advantage of these drills is that they are less costly than other simulations and do not require large numbers of volunteers and other personnel (Powers, 2007). It is important to note that table top exercises may improve and promote interdepartmental dialogue and inform other departments of each department's accountabilities for response. These two aspects are often diluted during a functional or hospital wide exercise. Starting with table top exercises may set the foundation for each department to strengthen their plans and procedures by being aware of each department's strengths and limitations.

In 2006, a study was conducted at Geelong Hospital, Barwon Health, Victoria, Australia to test the hypothesis that an audiovisual presentation of the hospital disaster plan followed by a simulated disaster exercise and debriefing improved staff knowledge, confidence, and hospital preparedness for disasters. Based on a pre- and post-intervention survey, survey scores prior to the intervention were poor. The pass rate was 18 percent. The same survey taken after the intervention (exercise) had a statistically significant pass rate of 50% (Bartley, Stella, Walsh, 2006).

Based only on the two studies, it is difficult to determine which means of education or training is best in increasing response capabilities and performance. Disaster drills appeared to be the most prevalent form of training in the literature, but consistent measures, outcomes and costs are still unavailable. However, current research does tell us that regardless of the type of module used, there should be

appropriate evaluation methods to test pre and post-testing comparison groups.

The JHH survey presented an interesting dynamic on two key questions. Q18, asked if JHH provided competency-based training. 56 percent of the respondents answered either "no" or "don't know." When asked in Q20 if the hazards preparedness training increased the individual level of knowledge and readiness, 92 percent answered "yes." The limitations to Q18 may be in the format of the question. The respondents may not have understood what was meant by competency-based training. Nonetheless, further discussion surrounding types of training should be implemented into the current disaster plan in conjunction with pre- and post-testing assessments.

*Individual and Family Preparedness Plans*

In May 2007, the American Public Health Association conducted a national on-line survey among 925 adults, including 523 members of the general public, and over samples of 210 mothers with children up to five years old, 306 hourly-wage workers, and 409 adults with chronic medical conditions. Figure 9 below illustrates how ill-prepared both the general public and employers are for disasters.

**How Well Prepared Are You?**

| | General Public % | Mothers With Young Children % | Hourly Workers % | People With Chronic Illness % | Employers % | School Administrators % |
|---|---|---|---|---|---|---|
| Very well prepared | 3 | 1 | 4 | 3 | 3 | 8 |
| Fairly well prepared | 24 | 13 | 22 | 26 | 27 | 27 |
| Just somewhat well | 37 | 45 | 42 | 38 | 39 | 42 |
| Not very well | 25 | 31 | 19 | 27 | 22 | 21 |
| Not prepared at all | 8 | 7 | 9 | 5 | 7 | 2 |

*Figure 9.* American Public Health Association, National Opinion Survey to Determine Levels of Preparedness for a Public Health Crisis. February, 2007.

In 2003, an annual study of disaster preparedness was conducted and concluded that nearly two-thirds (64 percent) of households in America's largest cities do not have disaster preparedness plans and 38 percent say being prepared for a disaster is not a personal priority (Business Wire, 2003). Washington D.C. (in the same geographical region as Baltimore) ranked third on the list with only 37 percent having family preparedness plans. A more recent poll was conducted in April 2007 by the American Red Cross and Harris Interactive concluded that only seven percent of the population has taken what the Red Cross considers the three steps necessary to prepare for a disaster or emergency: get a kit, make a plan, and be informed (American Red Cross, 2007).

In the CBRNE/All Hazards survey conducted at Johns Hopkins Hospital, employees were asked if their department kept individual and family preparedness plans on file for all their staff (Q13). The results show that 74 percent answered "no." These results suggest a common question: Is it the responsibility of the employer to mandate individual and family preparedness plans?

To help answer this question, a review of the JCAHO Standards Related to Emergency Management in Hospitals was conducted. In the JCAHO Standards, while individual and family preparedness plans are not mandated, JCAHO does have the following standards:

- Standard 4.10.9 states that the plan provides for identifying and assigning personnel to cover all essential staff functions under emergent conditions
- Standard 4.10.14 states that the plan provides for processes for identifying care providers and other personnel during emergencies.
- Standard 4.10.19 states that the plan identifies alternate roles and responsibilities of staff during emergencies, including who they report to in the Hospital's command structure.

It is evident that, based on the literature, figures from the national polls mentioned

above, the results of the survey conducted at JHH, and JCAHO Standards, JH must bridge the gap between their current level of preparedness and future response capabilities by incorporating individual and family preparedness plans into its disaster plan.

## Conclusion and Recommendations

The tragic events of September 11th and Hurricane Katrina have forced our hospitals, emergency medical services, trauma systems, and other local, state, and federal agencies to reevaluate their current levels of disaster preparedness. Current literature provides vast amounts of resources in hospital preparedness but little consistent information as to how we can measure our current state of preparedness. The survey conducted at Johns Hopkins Hospital provides an invaluable insight into the key gaps associated with overall preparedness. The survey also gives Johns Hopkins Hospital a baseline measurement tool to use as bridge for crossing those gaps and working towards true preparedness.

The following four recommendations are based on the results of the questionnaire and literature review:

First, JHH should use the initial survey as a baseline for future discussion and analysis. Prior to issuing the survey again in six months to check for reliability through test-retest, the survey should be reconfigured to reflect the following:

- Reformat the survey to include respondent demographics and organizational position held
- Change the target population to reflect all clinical and non-clinical staff at JHH to assess for gaps in the respondent answers for general knowledge and individual perception regarding levels of preparedness.

Second, since a survey of this type had never been administered at JHH, there was no established threshold of adequacy for any of the objectives. I would suggest

that JHH issue the original AHRQ survey as a baseline to compare with other healthcare organizations with similar demographics. Comparing the results with other organizations is extremely difficult when the survey has been tailored to meet the immediate and individual needs of an organization.

Third, JHH should implement pre- and post-assessment surveys or questionnaires to assess the effectiveness for the different modes of disaster training. The original questionnaire only assessed for levels of perception in regards to training and was not able to analyze why a respondent answered "no."

Fourth, JHH should mandate individual and family preparedness plans for all staff members. Readiness begins at the individual level and organizations must ensure that adequate measures are in place for staff recall and shelter in place procedures.

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# Appendix A

## Chemical, Biological, Radiological, Nuclear, Explosive (CBRNE) Preparedness Survey (43 Questions)

| QUESTION | WORDING |
|---|---|
| Q1 | Has the hospital designated a coordinator (or group/committee) who is responsible for overseeing all of the hospital's CBRNE preparedness efforts? |
| Q2 | Has the hospital designated a medical director (or group) for its CBRNE preparedness efforts? |
| Q3 | Does the hospital use an Incident Command System (ICS) to manage events that impact normal operations? |
| Q4 | Has the hospital designated an individual to manage and maintain its decontamination capability? |
| Q5 | Does the hospital have a plan for a CBRNE event that is reviewed and updated? |
| Q6 | Are funds for CBRNE preparedness (i.e., planning, training, operations, etc.) included into the hospital's budget? |
| Q7 | Does the hospital participate in a regional planning group (i.e., local/State public health department) or other groups responsible for regional CBRNE preparedness? |
| Q8 | Does the hospital provide competency-based training on CBRNE events to clinical staff? |
| Q9 | Does the hospital provide competency-based training on CBRNE events to non-clinical staff? |
| Q10 | Does the hospital provide training in accordance with Occupational Safety and Health Administration (OSHA) standards to personnel who may be part of the decontamination response? |
| Q11 | Have persons designated in the hospital's CBRNE/all hazards plan received training on the regional emergency planning group's CBRNE response plan? |
| Q12 | Do staff members participate in hospital-wide and/or regional CBRNE event exercises/drills? |
| Q13 | Is a mechanism in place for the rapid receipt and posting of public health alerts during a CBRNE event from agencies such as Public Health, poison control, Health Alert Network, Centers for Disease Control and Prevention (CDC), etc.? |
| Q14 | Does the hospital have a dedicated system for staff information and call-in inquiries during a CBRNE event? |
| Q15 | Does the Emergency Department have Internet access located in the department? |
| Q16 | Is the hospital a participant in a regional system to monitor Emergency Department diversion status? |
| Q17 | Does the hospital's CBRNE/all hazards plan designate a position or individual (such as a Public Information Officer) to communicate about a CBRNE event to the media? |
| Q18 | Are protocols in place for the release of information regarding the number of CBRNE casualties to the appropriate external agencies? |
| Q19 | Does the hospital's CBRNE/all hazards plan address procedures that staff should follow in reporting a suspected CBRNE event to the appropriate external agencies? |
| Q20 | Is there a procedure in place for providing patient tracking (from initial triage to hospital admission or discharge)? |
| Q21 | Is the hospital a participant in a regional system to monitor bed availability? |
| Q22 | Does the hospital's CBRNE/all hazards plan address policies and procedures for increasing inpatient bed capacity? |
| Q23 | Does the hospital's CBRNE/all hazards plan address alternative treatment sites to serve patients during a CBRNE event? |
| Q24 | Does the hospital have protocols or memoranda of understanding (MOUs) in place with other area treatment facilities (e.g., hospitals, ambulatory care centers, extended care facilities) to transfer patients as a result of a CBRNE event? |

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|---|---|
| Q25 | Does the hospital have procedures that allow morgue capacity to be increased in case of mass fatalities? |
| Q26 | Does the hospital's CBRNE/all hazards plan address procedures for expanding staff availability (e.g., callback lists, policies for overtime, staffing centers, etc.) during a CBRNE event? |
| Q27 | Does the hospital have policies for the advance registration and credentialing of clinicians needed to augment hospital staff in case of a CBRNE event? |
| Q28 | Does the hospital have provisions for temporary housing and feeding personnel when needed during a CBRNE event? |
| Q29 | Is mental health support available as a component of the care provided to staff in a CBRNE event? |
| Q30 | Does the hospital's Chemical, Biological, Radiological, Nuclear, and Explosive Events (CBRNE)/all hazards plan address decontamination? |
| Q31 | Does the hospital have access to decontamination showers? |
| Q32 | Do emergency department personnel (or the emergency decontamination team) have 24-hours-a-day/7-days-a-week access to appropriate radiation detectors (as defined by the hospital's hazard vulnerability assessment)? |
| Q33 | Do emergency department personnel (or the emergency decontamination team) have 24-hours-a-day/7-days-a-week access to appropriate personal dosimeters (as defined by the hospital's hazard vulnerability assessment)? |
| Q34 | Is appropriate personal protective equipment (PPE, as defined by the hospital's hazard vulnerability assessment) provided to personnel involved in the decontamination response? |
| Q35 | Does the hospital have a written respiratory protection program that is in compliance with Occupational Safety and Health Administration (OSHA) standards? |
| Q36 | Does the hospital have negative-pressure isolation room(s) within the facility? |
| Q37 | Has the hospital identified contingency suppliers of resources needed during a CBRNE event? |
| Q38 | Does the hospital's CBRNE/all hazards plan address procedures to expand storage capacity for additional supplies/equipment needed during a CBRNE event? |
| Q39 | Does the hospital maintain its own cache of medications (such as antibiotics and chemical antidotes) for use for 3 days during a CBRNE event? |
| Q40 | Does the hospital have agreements in place for accessing additional supplies of medications from outside resources during a CBRNE event? |
| Q41 | Does the hospital's CBRNE/all hazards plan address procedures for receiving and distributing prophylactic and/or treatment medications? |
| Q42 | Does the hospital have a laboratory support plan for managing CBRNE events? |
| Q43 | Does the hospital have the capability to report syndromic data of a CBRNE event to the local, regional or State health department? |

Source: Agency for Healthcare Research and Quality, April 2007.

# Appendix B

## Cross-walk of Chemical, Biological, Radiological, Nuclear, Explosive (CBRNE) Preparedness Survey (43 Questions) and JH Survey

| AHRQ QUESTION | WORDING | WAS QUESTION USED IN PROJECT? | OBJECTIVE |
|---|---|---|---|
| Q1 | Has the hospital designated a coordinator (or group/committee) who is responsible for overseeing all of the hospital's CBRNE preparedness efforts? | Yes | 1 |
| Q2 | Has the hospital designated a medical director (or group) for its CBRNE preparedness efforts? | Yes | 1 |
| Q3 | Does the hospital use an Incident Command System (ICS) to manage events that impact normal operations? | Yes | 1 |
| Q4 | Has the hospital designated an individual to manage and maintain its decontamination capability? | Yes | 1 |
| Q5 | Does the hospital have a plan for a CBRNE event that is reviewed and updated? | No | N/A |
| Q6 | Are funds for CBRNE preparedness (i.e., planning, training, operations, etc.) included into the hospital's budget? | Yes | 1 |
| Q7 | Does the hospital participate in a regional planning group (i.e., local/State public health department) or other groups responsible for regional CBRNE preparedness? | Yes | 2 |
| Q8 | Does the hospital provide competency-based training on CBRNE events to clinical staff? | Yes | 2 |
| Q9 | Does the hospital provide competency-based training on CBRNE events to non-clinical staff? | No | N/A |
| Q10 | Does the hospital provide training in accordance with Occupational Safety and Health Administration (OSHA) standards to personnel who may be part of the decontamination response? | Yes | 2 |
| Q11 | Have persons designated in the hospital's CBRNE/all hazards plan received training on the regional emergency planning group's CBRNE response plan? | Yes | 1 |
| Q12 | Do staff members participate in hospital-wide and/or regional CBRNE event exercises/drills? | No | N/A |
| Q13 | Is a mechanism in place for the rapid receipt and posting of public health alerts during a CBRNE event from agencies such as Public Health, poison control, Health Alert Network, Centers for Disease Control and Prevention (CDC), etc.? | No | N/A |
| Q14 | Does the hospital have a dedicated system for staff information and call-in inquiries during a CBRNE event? | Yes | 1 |
| Q15 | Does the Emergency Department have Internet access located in the department? | No | N/A |
| Q16 | Is the hospital a participant in a regional system to monitor Emergency Department diversion status? | No | N/A |
| Q17 | Does the hospital's CBRNE/all hazards plan designate a position or individual (such as a Public Information Officer) to communicate about a | No | N/A |

| | | | |
|---|---|---|---|
| | CBRNE event to the media? | | |
| Q18 | Are protocols in place for the release of information regarding the number of CBRNE casualties to the appropriate external agencies? | No | N/A |
| Q19 | Does the hospital's CBRNE/all hazards plan address procedures that staff should follow in reporting a suspected CBRNE event to the appropriate external agencies? | No | N/A |
| Q20 | Is there a procedure in place for providing patient tracking (from initial triage to hospital admission or discharge)? | No | N/A |
| Q21 | Is the hospital a participant in a regional system to monitor bed availability? | No | N/A |
| Q22 | Does the hospital's CBRNE/all hazards plan address policies and procedures for increasing inpatient bed capacity? | Yes | 1 |
| Q23 | Does the hospital's CBRNE/all hazards plan address alternative treatment sites to serve patients during a CBRNE event? | Yes | 1 |
| Q24 | Does the hospital have protocols or memoranda of understanding (MOUs) in place with other area treatment facilities (e.g., hospitals, ambulatory care centers, extended care facilities) to transfer patients as a result of a CBRNE event? | No | N/A |
| Q25 | Does the hospital have procedures that allow morgue capacity to be increased in case of mass fatalities? | No | N/A |
| Q26 | Does the hospital's CBRNE/all hazards plan address procedures for expanding staff availability (e.g., callback lists, policies for overtime, staffing centers, etc.) during a CBRNE event? | Yes | 3 |
| Q27 | Does the hospital have policies for the advance registration and credentialing of clinicians needed to augment hospital staff in case of a CBRNE event? | No | N/A |
| Q28 | Does the hospital have provisions for temporary housing and feeding personnel when needed during a CBRNE event? | No | N/A |
| Q29 | Is mental health support available as a component of the care provided to staff in a CBRNE event? | Yes | 1 |
| Q30 | Does the hospital's Chemical, Biological, Radiological, Nuclear, and Explosive Events (CBRNE)/all hazards plan address decontamination? | No | N/A |
| Q31 | Does the hospital have access to decontamination showers? | No | N/A |
| Q32 | Do emergency department personnel (or the emergency decontamination team) have 24-hours-a-day/7-days-a-week access to appropriate radiation detectors (as defined by the hospital's hazard vulnerability assessment)? | No | N/A |
| Q33 | Do emergency department personnel (or the emergency decontamination team) have 24-hours-a-day/7-days-a-week access to appropriate personal dosimeters (as defined by the hospital's hazard vulnerability assessment)? | No | N/A |
| Q34 | Is appropriate personal protective equipment (PPE, as defined by the hospital's hazard vulnerability assessment) provided to personnel involved in the decontamination response? | No | N/A |

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|---|---|---|---|
| Q35 | Does the hospital have a written respiratory protection program that is in compliance with Occupational Safety and Health Administration (OSHA) standards? | Yes | AOI |
| Q36 | Does the hospital have negative-pressure isolation room(s) within the facility? | Yes | 1 |
| Q37 | Has the hospital identified contingency suppliers of resources needed during a CBRNE event? | Yes | 1 |
| Q38 | Does the hospital's CBRNE/all hazards plan address procedures to expand storage capacity for additional supplies/equipment needed during a CBRNE event? | Yes | 1 |
| Q39 | Does the hospital maintain its own cache of medications (such as antibiotics and chemical antidotes) for use for 3 days during a CBRNE event? | No | N/A |
| Q40 | Does the hospital have agreements in place for accessing additional supplies of medications from outside resources during a CBRNE event? | No | N/A |
| Q41 | Does the hospital's CBRNE/all hazards plan address procedures for receiving and distributing prophylactic and/or treatment medications? | No | N/A |
| Q42 | Does the hospital have a laboratory support plan for managing CBRNE events? | No | N/A |
| Q43 | Does the hospital have the capability to report syndromic data of a CBRNE event to the local, regional or State health department? | No | N/A |

Notes: Not every question on the JHH survey was taken directly from the AHRQ survey, not every question fell under an objective, and the questions were adapted for use by JHH. Two of the 21 questions in the final survey came from areas of interest selected by Howard Gwon and the Emergency Management Committee and were not used for the basis of this study. The areas of interest questions are classified as "AOI". Objectives 4 and 5 were not on the original AHRQ survey but were selected as areas of interest by JHH.

# Appendix C

## Chemical, Biological, Radiological, Nuclear, Explosive (CBRNE) Preparedness Survey
## Johns Hopkins Hospital
## (Adapted from original AHRQ Survey, dated June 15, 2007)

| JHH QUESTION | WORDING | OBJECTIVE |
|---|---|---|
| Q1 | Does Johns Hopkins Hospital have a designated coordinator (or group/committee) responsible for overseeing all of the hospital's hazards preparedness efforts, including Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE)? | 1 |
| Q2 | Does Johns Hopkins Hospital have a dedicated system for staff information and call-in inquiries during a CBRNE/all hazards event? | 1 |
| Q3 | Does the John Hopkins Hospital CBRNE/all hazard plan address policies and procedures for increasing inpatient bed capacity? | 1 |
| Q4 | Is mental health support available as a component of the care provided to staff in a CBRNE/all hazards event? | 1 |
| Q5 | Does the Johns Hopkins Hospital CBRNE/all hazard address decontamination and negative pressure needs? | 1 |
| Q6 | Has Johns Hopkins identified and stockpiled contingency supplies needed during a CBRNE/all hazards event? | 1 |
| Q7 | Does your department have a designated coordinator responsible for overseeing and responding to all hazards events, including Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE)? | 1 |
| Q8 | Does your department use an Incident Command System (ICS) approach to manage events that impact normal operations? | 1 and 3 |
| Q9 | Does your department have CBRNE procedures associated with the overall hospital policy and procedures that are reviewed and updated? | 1 |
| Q10 | Does your department have a dedicated system for staff information and call-in inquiries during a CBRNE/all hazards event? | 1 |
| Q11 | Does your departmental CBRNE/all hazard plan that addresses procedures for expanding staff availability (e.g. callback lists, policies for overtime, staffing centers, etc.) during a CBRNE/all hazard event? | 1 |
| Q12 | Has your department identified and stockpiled contingency supplies needed during a CBRNE/all hazards event? | 1 |
| Q13 | Does your department keep on file individual and family preparedness plans for all your staff? | 4 |
| Q14 | Has your department allocated any of its operating budget to spend on emergency response? | * |
| Q15 | Did your department ask the Health Safety and Environment department to train your employees on how to protect them when hospital decontamination procedures are activated? | * |
| Q16 | Have you asked the Health Safety and Environment department to train your employees on the respiratory protection program? | * |
| Q17 | Have you participated in a Johns Hopkins-wide or regional CBRNE/all hazards exercise or drill in the past 5 years? | 2 |
| Q18 | Does Johns Hopkins provide competency-based training on hazards preparedness efforts, including Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE)? | 2 |
| Q19 | How many training sessions on hazards preparedness have you attended during the past 12 months? | 5 |
| Q20 | Did the hazards preparedness training increase your level of knowledge and readiness? | 2 |
| Q21 | Do you feel that you've been adequately trained to respond to a CBRNE/all | 5 |

| | | |
|---|---|---|
| | hazards event? | |

* These questions were only looked at by Howard Gwon and the Emergency Management Committee for general knowledge and were not used for the basis of the objectives in this project.

Appendix D

Survey Results and Analysis
for
JHH Chemical, Biological, Radiological, Nuclear, Explosive (CBRNE) Preparedness Survey (N = 85)
Respondents = 35

| Question | Yes | No | Don't Know | Comments |
|---|---|---|---|---|
| Q1 | 35 | 0 | 0 | |
| Q2 | 31 | 0 | 4 | |
| Q3 | 31 | 0 | 3 | 1 Participant did not answer |
| Q4 | 28 | 0 | 7 | |
| Q5 | 31 | 0 | 4 | |
| Q6 | 25 | 1 | 9 | |
| Q7 | 32 | 1 | 2 | |
| Q8 | 26 | 7 | 2 | |
| Q9 | 28 | 4 | 3 | |
| Q10 | 29 | 4 | 2 | |
| Q11 | 32 | 2 | 1 | |
| Q12 | 15 | 15 | 5 | |
| Q13 | 3 | 26 | 6 | |
| Q14 | 8 | 18 | 8 | 1 Participant did not answer |
| Q15 | 9 | 20 | 6 | |
| Q16 | 12 | 17 | 6 | |
| Q17 | 24 | 11 | 0 | |
| Q18 | 15 | 3 | 16 | 1 Participant did not answer |
| Q19 | NA | NA | NA | None=9; 1-2=11; 3-4=9; 5-6=1 6 or higher=5 |
| Q20 | 24 | 2 | 0 | 9 Participants did not answer |
| Q21 | 19 | 13 | 3 | |